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Dividends and Investment: Evidence of Heterogeneous Firm Behavior

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Abstract

This article investigates the relationship between dividend payouts and corporate investment. We find significant heterogeneity in the relationship across firms—heterogeneity that helps reconcile competing results in the literature. Drawing on financial filing data from Compustat, we first broadly replicate the statistically significant negative relationship estimated by Auerbach and Hassett. We show that this relationship does not hold if the variation is restricted to within-firm only. Our null results suggest a relatively precise zero estimate for the mean firm. Next, we investigate heterogeneity in the relationship between dividends and investment. Using quantile regression methods, we find that this negative relationship is concentrated at the top of dividends distribution: only firms from the seventieth percentile and above exhibit a strongly negative relationship, and

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it is these firms that drive the negative estimates of pooled ordinary least square regressions reported in prior work.

Keywords
dividends, investment, corporate finance, firm heterogeneity

What is the relationship between dividends and investment? Tax or other policy that impacts profit distribution may reduce cash on hand and thus corporate investment—an important driver of real-economy outcomes like firm and worker productivity. This article attempts to better understand the relationship between dividends and corporate investment by moving beyond estimating mean dividend behavior conditional on investment. We find that there is significant heterogeneity in the relationship across firms—heterogeneity which helps reconcile competing results in the literature.

Recent work by Yagan (2015) shows that the 2003 dividend tax cut and subsequent surge in dividend payouts failed to increase corporate investment. Prior studies over longer time horizons have found that either no significant relationship exists between investment and dividend payouts (Fama 1974; Smirlock and Marshall 1983) or that they are negatively related—that is, when corporate investment rises, dividend payout declines.

These studies, such as Dhrymes and Kurz (1967), and more recently Auerbach and Hassett (2003), Desai and Goolsbee (2004), and Korinek and Stiglitz (2009) focus on mean behavior. We find that estimates of average firm behavior belie significant heterogeneity. Using data from firm financial filings reported in Compustat, we reconcile the findings of Auerbach and Hassett (2003) with the more recent quasi-experiment-based evidence of Yagan (2015). The negative correlation found by Auerbach and Hassett (2003) among others suggests that the surge in dividend payouts following the 2003 dividend tax cut should have led to a reduction in investment, which Yagan (2015) did not find. We find that most firms, and even the average firm, do not exhibit a negative relationship between dividends and investment and help to explain why Yagan (2015) found no effect. The estimates presented here show that even over a long-time horizon, the negative relationship between dividends and investment is driven by cross-sectional correlation and not the overtime within variation that drives the quasi-experimental results.

The relationship between dividend payouts and corporate investment is of interest to policy makers and economists alike. Recent years have seen both reductions and increases in dividend tax rates, each time sparking debate on how these tax rates affect investment incentives. Empirical investigations by Chetty and Saez (2005), Blouin, Raedy, and Shackelford (2011), and Edgerton (2013), among others, have shown that the 2003 dividend tax reduction led to higher dividend payouts. The ultimate impact on investment—the "real-economy" outcome of interest—of these higher payouts hinges on whether firms finance marginal investment projects with equity issuances, debt, or retained earnings—and, in the last case, how lower retained earnings affects investment. Understanding how corporate investment directly relates to profit distribution can help policy makers better appreciate the ultimate impact of policies that affect payouts.[1]

Drawing on financial filing data from Compustat, we investigate the relationship between firm dividend payouts and investment levels. First, we broadly replicate the statistically significant negative relationship estimated by Auerbach and Hassett (2003). We show that this relationship does not hold if the variation is restricted to within-firm only—that is, the previously estimated negative correlation is an artifact of cross-sectional variation. Our results yield a relatively precise zero estimate for the mean firm. Next, we investigate heterogeneity in the relationship between dividends and investment that examining means alone could mask. Using quantile regression methods, we investigate how the relationship varies across the distribution of dividend payouts. Estimates of the average firm's behavior belie significant heterogeneity. We find that this negative relationship is concentrated at the top of dividends distribution. Firms from the seventieth percentile and above exhibit a strongly negative relationship—it is these firms that drive the negative estimates of pooled ordinary least square (OLS) regressions reported in prior work.

This more nuanced picture of how dividend payouts relate to corporate investment has two implications. Policy makers may view measures likely to encourage dividend payouts differently, given that it is in fact high-payout firms that exhibit a strong negative correlation between payouts and investment. Policies that encourage dividend payouts may actually *reduce* corporate investment for these firms. They will also produce windfall gains at inframarginal firms. Under weak assumptions, both of these effects imply net welfare losses. Second, the observed heterogeneity among firms in the relationship between dividends and investment is consistent with the idea that different firms pay dividends differently. Our results show a type of heterogeneity in firm behavior that is consistent with the lifecycle model posited by Korinek and Stiglitz (2009), although we do not establish a directly one-to-one relationship between our results and their model. The high-dividend firms that we observe exhibiting a negative correlation between dividend payout and investment would be consistent with the behavior of steady state firms in their framework. We find no such negative correlation for the bottom 70 percent of firms in terms of dividends; in the Korinek and Stiglitz (2009) framework, these firms would correspond to new and in-transition firms.

We now turn to presenting our results in detail, after which we conclude by discussing their policy implications and by suggesting a few interesting avenues of future research.

Data and Sample

We utilize data from Compustat North America (Annual Fundamentals), a database that provides annual financial information on publicly traded firms in the United States and Canada. Each firm's information is reported at the end of its fiscal year, giving us an unbalanced panel with one observation per firm per fiscal year.[2,3] Compustat data are available back to January 1950, but we restrict our sample to fiscal years 1964 through 2011[4] since data are scant prior to 1964.[5] We exclude Canadian firms, as well as firm–year observations in which a firm underwent a major merger or reorganization. We also exclude firms in finance, insurance, and real estate, which have two-digit North American Industrial Classification System (NAICS) codes of 52 or 53.[6] We drop firm–year observations with missing values for any of the variables used in our analysis.

The main variables used in our analysis include total common/ordinary dividends (DIV_{it}), investment spending ($INVEST_{it}$), cash flow ($CASH_{it}$), total firm value at the end of the previous fiscal year ($VALUE_{it}$), and total debt ($DEBT_{it}$), where i indexes firms and t indexes fiscal years. Investment equals capital expenditures. Cash flow equals after-tax income plus depreciation. Value is the value of the firm's common stock. Debt is the sum of the firm's financial obligations, including short-term and long-term debt. We divide all variables by the firm's total assets at the end of the previous fiscal year to adjust for scale.

Table 1 shows how these variables are constructed from the original Compustat variables. We winsorize all of these variables at the 1 percent level in order to limit the influence of outliers.[7] In all our regressions, we lag the independent variables ($INVEST_{it}$, $CASH_{it}$, $VALUE_{it}$, and $DEBT_{it}$) by one year. In some specifications, we utilize a set of ten investment bins or indicator variables based on the deciles of lagged investment ($INVEST_{i,t-1}$). As additional controls, we construct a set of industry dummies based on two-digit NAICS

Table 1. Description of Variables.

Analysis variable	Compustat variables
Dividends (DIV_{it})	$DVC_{it}/AT_{i,t-1}$
Investment ($INVEST_{it}$)	$CAPXV_{it}/AT_{i,t-1}$
Cash flow ($CASH_{it}$)	$(IBCOM_{it} + DP_{it})/AT_{i,t-1}$
Firm value ($VALUE_{it}$)	$(PRCC\_F_{i,t-1} \times CSHO_{i,t-1})/AT_{i,t-1}$
Total debt ($DEBT_{it}$)	$(DLTT_{it} + DLC_{it})/AT_{i,t-1}$

Note: Description of Compustat variables: DVC_{it} = dividends common/ordinary; $AT_{i,t-1}$ = assets total; $CAPXV_{it}$ = capital expenditure (property, plant, and equipment schd V); $IBCOM_{it}$ = income before extraordinary items/available for common; DP_{it} = depreciation and amortization; $PRCC\_F_{i,t-1}$ = price close (annual/fiscal); $CSHO_{i,t-1}$ = common shares outstanding; $DLTT_{it}$ = long-term debt (total); DLC_{it} = debt in current liabilities (total).

codes. To eliminate sparse industry cells, we combine the NAICS codes for agriculture, forestry, fishing, and hunting with mining (11) and quarrying, and oil and gas extraction (21); for educational services (61) and health care and social assistance (62); and for arts, entertainment, and recreation (71), accommodation and food services (72), and other services except public administration (81). We also construct a set of ten firm size dummies based on assigning firm–year observations to asset deciles within each fiscal year. Finally, we construct a set of fiscal year dummies.

Our full sample consists of 170,183 firm–year observations. Summary statistics for this sample are given in table 2. Note that for more than 60 percent of these observations, dividends are zero. However, many of these zero dividend observations represent firms that have never paid a dividend; these are likely to be young firms. Thus, following Auerbach and Hassett (2003), we define a more restrictive sample—which we refer to as the sample of mature firms—consisting of firms that have paid a dividend at some point from the beginning of the sample period (fiscal year 1964) through the last year of observation.[8] For example, a firm that paid no dividends from 1964 through 1979 but paid a dividend in 1980 would be classified as mature from 1980 onward. The mature sample includes 95,937 firm–year observations, and its summary statistics are shown in table 3. Among the mature sample, less than 30 percent of the observations have zero dividends.

Empirical Strategies and Results

Building on Auerbach and Hassett (2003), our goal is to study the relationship between current period dividend payouts and lagged investment,

Table 2. Summary Statistics for All Firms, 1964 to 2011.

Variable	Mean	Standard deviation	Minimum	Maximum
Financial variables				
Dividends (DIV_{it})	0.01	0.02	0	0.11
Fraction with zero dividends	0.60	0.49	0	1
Lagged investment ($INVEST_{i,t-1}$)	0.09	0.11	0	0.72
Lagged cash flow ($CASH_{i,t-1}$)	−0.03	0.49	−3.6	0.44
Lagged firm value ($VALUE_{i,t-1}$)	1.70	2.98	0.05	22.14
Lagged total debt ($DEBT_{i,t-1}$)	0.32	0.37	0	2.53
Fiscal year	1993.11	11.52	1964	2011
Industry (North American Industrial Classification System code)				
Agriculture, forestry, fishing and hunting (11); mining, quarrying, and oil and gas extraction (21)	0.07	0.25	0	1
Utilities (22)	0.05	0.22	0	1
Construction (23)	0.02	0.13	0	1
Manufacturing (31–33)	0.50	0.50	0	1
Wholesale trade (42)	0.04	0.20	0	1
Retail trade (44–45)	0.06	0.23	0	1
Transportation and warehousing (48–49)	0.03	0.17	0	1
Information (51)	0.09	0.29	0	1
Professional, scientific, and technical services (54)	0.05	0.21	0	1
Administrative and support and waste management and remediation services (56)	0.02	0.15	0	1
Educational services (61); health care and social assistance (62)	0.02	0.14	0	1
Accommodation and food services (72); other services except public administration (81)	0.04	0.19	0	1
Unclassifiable (99)	0.02	0.13	0	1

Note: All statistics based on the full sample of 170,183 firm–year observations. Dividends, investment, cash flow, value, and debt are scaled by the firm's assets.

conditional on firm value and cash flows. It is also important to control for the firm's initial level of debt, to measure debt capacity and thereby account for the possibility of using additional borrowing as a source of funds.

We begin by estimating OLS and Tobit regressions on both the full and mature samples. Our basic specification is as follows:

Table 3. Summary Statistics for Mature Firms, 1964 to 2011.

Variable	Mean	Standard Deviation	Minimum	Maximum
Financial variables				
Dividends (DIV_{it})	0.02	0.02	0	0.11
Fraction with zero dividends	0.29	0.46	0	1
Lagged investment ($INVEST_{i,t-1}$)	0.08	0.09	0	0.72
Lagged cash flow ($CASH_{i,t-1}$)	0.09	0.15	−3.6	0.44
Lagged firm value ($VALUE_{i,t-1}$)	1.02	1.33	0.05	22.14
Lagged total debt ($DEBT_{i,t-1}$)	0.30	0.26	0	2.53
Fiscal year	1990.42	12.28	1964	2011
Industry (North American Industrial Classification System code)				
Agriculture, forestry, fishing and hunting (11); mining, quarrying, and oil and gas extraction (21)	0.05	0.23	0	1
Utilities (22)	0.09	0.28	0	1
Construction (23)	0.02	0.14	0	1
Manufacturing (31–33)	0.51	0.50	0	1
Wholesale trade (42)	0.05	0.21	0	1
Retail trade (44–45)	0.07	0.25	0	1
Transportation and warehousing (48–49)	0.04	0.20	0	1
Information (51)	0.07	0.25	0	1
Professional, scientific, and technical services (54)	0.03	0.18	0	1
Administrative and support and waste management and remediation services (56)	0.02	0.14	0	1
Educational services (61); health care and social assistance (62)	0.01	0.12	0	1
Accommodation and food services (72); other services except public administration (81)	0.04	0.19	0	1
Unclassifiable (99)	0.01	0.11	0	1

Note: All statistics based on the mature sample of 95,937 observations. Dividends, investment, cash flow, value, and debt are scaled by the firm's assets.

$$DIV_{it} = \alpha + \beta_1 INVEST_{i,t-1} + \beta_2 CASH_{i,t-1} + \beta_3 VALUE_{i,t-1} + \beta_4 DEBT_{i,t-1} + YEAR_t + INDUSTRY_{it} + \varepsilon_{it}. \quad (1)$$

Here, the financial variables are as defined in the previous section, $YEAR_t$ is a fiscal year fixed effect, $INDUSTRY_{it}$ is an industry fixed effect, and ε_{it} is a stochastic error term. The Tobit regressions adjust for the fact that there are a large number of zero-dividend observations (censored observations), particularly in the full sample. The results from these basic models are presented in table 4. The standard errors are clustered by firm.

The first four columns of table 4 present OLS and Tobit regressions for both the full and mature samples, omitting the size and industry dummies. The next four columns present the same specifications but include the size and industry dummies. Qualitatively, the results in the first eight columns match Auerbach and Hassett (2003; table 2). In all eight specifications, there is a negative and statistically significant relationship between lagged investment and dividend payments and a positive and statistically significant relationship between cash flows and dividend payments. Firm value is generally positively related to dividend payments, and debt is always negatively related to dividend payments. Inclusion of the size and industry dummies does not substantially alter the coefficients on the financial variables, suggesting that these relationships do not vary greatly by firm size or across industries. The Tobit coefficients are generally larger than the OLS coefficients, suggesting that censoring biases the OLS estimates downward. Note that our coefficients are generally smaller in magnitude than those found by Auerbach and Hassett (2003; table 2). Of course, our data differ from that of Auerbach and Hassett (2003). We include many more years of data and handle outliers differently, as we winsorize rather than drop observations in which the values of the variables fall outside a given range (e.g., our sample includes some firms with large negative values for cash flow that would have been dropped from their sample).

In addition to the specifications presented in Auerbach and Hassett (2003), we test the robustness of the model to firm fixed effects by estimating the following equation:

$$DIV_{it} = \alpha + \beta_1 INVEST_{i,t-1} + \beta_2 CASH_{i,t-1} + \beta_3 VALUE_{i,t-1} + \beta_4 DEBT_{i,t-1} + YEAR_t + FIRM_i + \varepsilon_{it} \quad (2)$$

These results are shown in the final two columns of table 4; in these regressions, we include firm fixed effects. The regressions also include size dummies. The estimated OLS coefficient on investment is negative in both the mature and the full sample but is insignificant in both specifications.[9] This suggests that the Auerbach and Hassett (2003) result is driven by variation in investment *across* firms not *within* firm. This has important implications for understanding the dividend behavior of firms and sheds light on which factors are important in driving the relationship found by Auerbach

Table 4. Regression of Dividends on Investment Using Ordinary Least Square (OLS) and Tobit Specifications.

Variable	(1) OLS	(2) Tobit	(3) OLS	(4) Tobit	(5) OLS	(6) Tobit	(7) OLS	(8) Tobit	(9) OLS	(10) OLS
Lagged investment	−0.003**	−0.034**	−0.009**	−0.020**	−0.005**	−0.038**	−0.012**	−0.025**	−0.000	−0.001
($INVEST_{i,t-1}$)	(0.001)	(0.003)	(0.002)	(0.003)	(0.001)	(0.003)	(0.002)	(0.003)	0.000	(0.001)
Lagged cash flow	0.007**	0.128**	0.036**	0.106**	0.004**	0.109**	0.033**	0.103**	0.002**	0.017**
($CASH_{i,t-1}$)	(0.000)	(0.006)	(0.002)	(0.008)	(0.000)	(0.007)	(0.002)	(0.008)	(0.000)	(0.002)
Lagged firm value	0.001**	−0.002**	0.004**	0.003**	0.001**	0.000	0.004**	0.003**	0.000**	0.002**
($VALUE_{i,t-1}$)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Lagged total debt	−0.003**	−0.013**	−0.011**	−0.015**	−0.006**	−0.026**	−0.014**	−0.024**	−0.004**	−0.013**
($DEBT_{i,t-1}$)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Sample	Full	Full	Mature	Mature	Full	Full	Mature	Mature	Full	Mature
Size dummies	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	No	No	No	No	Yes	Yes	Yes	Yes	No	No
Firm fixed effects	No	No	No	No	No	No	No	No	Yes	Yes
Observations	170,183	170,183	95,937	95,937	170,183	170,183	95,937	95,937	170,183	95,937
R^2	.114		.183		.207		.228		.052	.135

Note: The dependent variable for each regression is dividends divided by assets. Investment, cash flow, value, and debt are also scaled by the firm's assets. All regressions include a set of fiscal year dummies. Standard errors are clustered by firm. Standard errors in parentheses.

**Signifies statistical significance at the 1 percent level.

*Signifies the 5 percent level.

†The 10 percent level.

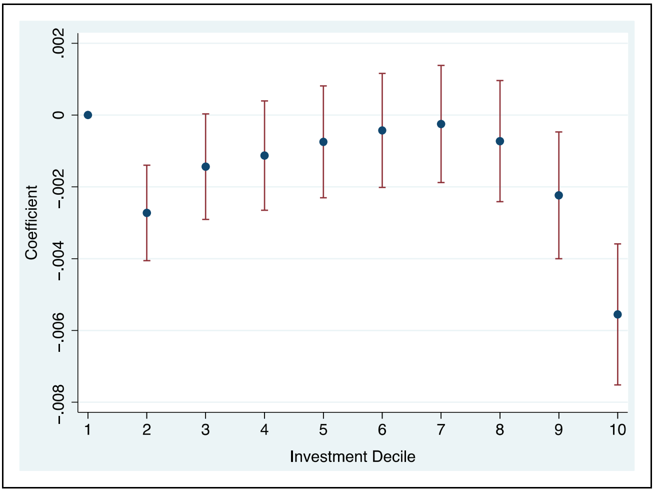

Figure 1. Investment bin regression coefficients. Sample includes all mature firms. The graph shows the regression coefficients from a regression of dividends on investment deciles and other controls.

and Hassett (2003). Rather than high-investment crowding out dividends for any given firm, the negative relationship estimated in the prior literature is driven from comparisons of high-investment firms that paid lower dividends to low-investment firms that paid larger dividends.

These basic linear models provide insight into the impact of investment on the conditional mean of dividend payments but do not help us characterize the distribution of dividend payments. We first explore nonlinearities in the relationship between investment and dividends along the distribution of investment using a simple, straightforward method. We create a set of indicator variables for the ten deciles of investment and use these in place of the linear investment variable in the regressions from table 4. We then plot the coefficients on the ten investment bins, along with 95 percent confidence intervals.

These plots are shown in figure 1 for the mature sample and figure 2 for the mature sample with fixed effects. In both cases, the omitted bin is the first decile of investment, and therefore its coefficient is set to zero. In figure 1, relative to the first investment decile, dividends are significantly lower throughout the distribution. However, they increase between the second and the seventh deciles of investment, then decrease beyond that. They are significantly lower at the tenth decile of investment. This pattern

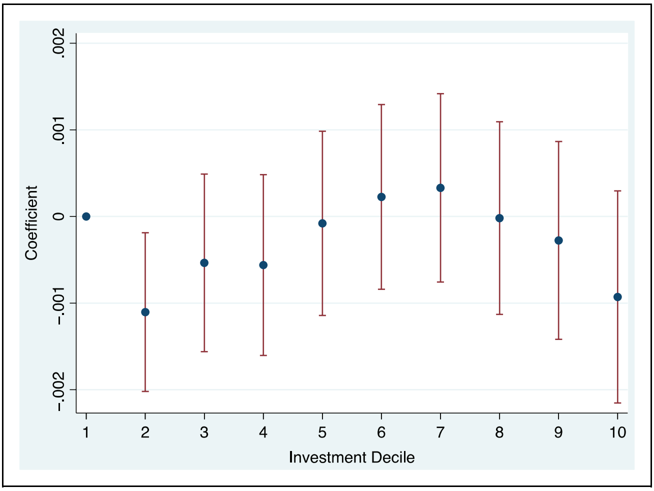

Figure 2. Investment bin regression coefficients (fixed effects model). Sample includes all mature firms. The graph shows the regression coefficients from a fixed effects regression of dividends on investment deciles and other controls.

suggests a nonlinear relationship between dividends and investment, indicating that the Auerbach and Hassett (2003) result of a negative relationship is primarily driven by firms that paid high dividends and made large investments. While the inverse U-shaped pattern is replicated in figure 2 with firm fixed effects, the differences across investment bins are generally not statistically significant. This suggests that the negative correlation between dividends and investment estimated in Auerbach and Hassett (2003) is driven primarily by between-firm variation—it is not that firms that invest heavily then pull back on dividends; instead, firms that invest heavily pay smaller dividends than low-investment firms.

Building off the simple method of binning investments, we estimate conditional quantiles functions (Koenker and Bassett 1982, Koenker and Hallock 2001) to study the heterogeneity in the relationship between lagged investment and dividend behavior with more structure. We seek to model the conditional quantiles (e.g., percentiles) of firms' dividend payments as a function of observed variables, in particular the lag of firm investment. An advantage of using quantile regressions is that its estimates are more robust to outliers than OLS. Further, if the response variable is subject to censoring, the conditional mean is not identifiable without additional distributional assumptions, but the conditional quantile is usually identifiable.

We therefore estimate a quantile regression model. We estimate standard errors for the coefficients using bootstrapping, taking account of between-quantile blocks. This allows us to test and construct confidence intervals comparing coefficients describing different quantiles. Results from the quantile regressions on mature firms are shown in tables 5 and 6. Table 6 estimates the quantile regression with fixed effects. Table 5 shows that for the middle and higher quantiles, the estimated relationship is negative and significant. At very high quantiles, dividend payments are strongly negatively linked to investments. (Bottom quantiles are censored.)

We also present these results graphically in figure 3. Figure 3 shows the results from our quantile regressions on mature firms, without fixed effects. The figure highlights the stark contrast between the linear relationship that we obtain using OLS, which fits the conditional mean, as opposed to quantile regression, which fits the conditional quantile.

While our results do not speak directly to the debate between the "new" and "old" view of the impact of dividend taxes on capital investment, our results suggest that the negative relationship between dividend payouts and investment that Auerbach and Hassett (2003) describe as consistent with the "new view" may not apply to all firms. Our results also imply that OLS estimates do not tell the whole story due to varying effect of investment at different points in the dividend distribution.

Table 6 and figure 4 present the results for a quantile regression with fixed effects, for mature firms. The estimation is done using the methodology described in Canay (2011). Although the lowest quantiles are censored, the nonconditional quantiles of the dividend payout distribution are not affected. For firms in the middle of the dividend distribution, that is, those in the fortieth to the sixtieth percentile, the estimated coefficient is not significantly different from zero. For the higher percentiles, the relationship between dividends and investment is negative. In other words, our results indicate that the negative relationship estimated with the use of the OLS model in Auerbach and Hassett (2003) is being driven by firms at the high end of the dividend distribution. The quantile regression approach suggests that the relationship is in fact nonlinear. These estimates are largely unaffected by changes in the definition of mature firms and investment and by the inclusion of firms that incurred losses or that issued new equity. In addition, our results are robust to a focus on the post-1986 period (estimates available upon request).

The weight of the evidence of our investigation suggests that the focus on the mean of dividend payments in Auerbach and Hassett (2003), conditional on lagged investment, masks the nonlinearity in the relationship between investments and dividend payments. With the use of quantile regression techniques

Table 5. Quantile Regression Approach: Dividends on Investment.

	Dividend quantiles								
Variable	(1) Tenth percentile	(2) Twentieth percentile	(3) Thirtieth percentile	(4) Fortieth percentile	(5) Fiftieth percentile	(6) Sixtieth percentile	(7) Seventieth percentile	(8) Eightieth percentile	(9) Ninetieth percentile
Lagged investment	0.000	0.000	−0.003**	−0.006**	−0.009**	−0.011**	−0.014**	−0.015**	−0.014**
($INVEST_{i,t-1}$)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.004)
Lagged cash flow	0.000	0.006**	0.017**	0.025**	0.031**	0.036**	0.043**	0.046**	0.052**
($CASH_{i,t-1}$)	(0.000)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
Lagged firm value	0.000**	0.000*	0.001**	0.003**	0.004**	0.006**	0.008**	0.011**	0.016**
($VALUE_{i,t-1}$)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Lagged total debt	0.000	−0.003**	−0.007**	−0.010**	−0.011**	−0.012**	−0.013**	−0.012**	−0.011**
($DEBT_{i,t-1}$)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Observations	95,937	95,937	95,937	95,937	95,937	95,937	95,937	95,937	95,937

Note: The dependent variable for the regression is dividends divided by assets. Investment, cash flow, value, and debt are also scaled by the firm's assets. The regression includes a set of fiscal year dummies. Standards errors are from a standard nonparametric bootstrap with 500 draws clustered on firm. The sample includes only mature firms. Standard errors in parentheses.

**Signifies statistical significance at the 1 percent level.

*Signifies the 5 percent level.

†The 10 percent level.

Table 6. Quantile Regression with Fixed Effects: Dividends on Investment.

	Dividend quantiles								
Variable	(1) Tenth percentile	(2) Twentieth percentile	(3) Thirtieth percentile	(4) Fortieth percentile	(5) Fiftieth percentile	(6) Sixtieth percentile	(7) Seventieth percentile	(8) Eightieth percentile	(9) Ninetieth percentile
Lagged investment	0.005**	0.003**	0.002*	0.000	−0.000	−0.001	−0.002**	−0.003**	−0.004**
($INVEST_{i,t-1}$)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Lagged cash flow	0.017**	0.016**	0.016**	0.016**	0.016**	0.017**	0.019**	0.021**	0.023**
($CASH_{i,t-1}$)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Lagged firm value	0.000*	0.001**	0.001**	0.002**	0.002**	0.002**	0.003**	0.004**	0.007**
($VALUE_{i,t-1}$)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Lagged total debt	−0.011**	−0.107**	−0.011**	−0.011**	−0.012**	−0.012**	−0.012**	−0.012**	−0.012**
($DEBT_{i,t-1}$)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Observations	95,937	95,937	95,937	95,937	95,937	95,937	95,937	95,937	95,937

Note: The dependent variable for the regression is dividends divided by assets. Investment, cash flow, value, and debt are also scaled by the firm's assets. The regression includes a set of fiscal year dummies. Standards errors are from a standard nonparametric bootstrap with 500 draws clustered on firm. The sample includes only mature firms. Standard errors in parentheses.

**Signifies statistical significance at the 1 percent level.

*Signifies the 5 percent level.

†The 10 percent level.

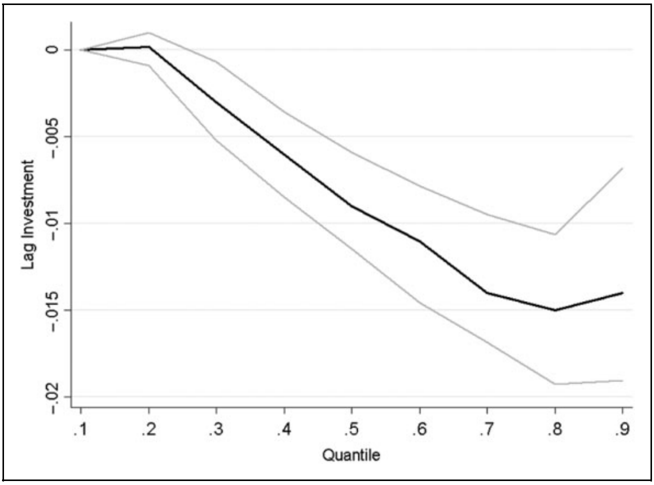

Figure 3. Quantile regression. Sample includes all mature firms. The graph shows the regression coefficients from a quantile regression of dividends on investment and other controls.

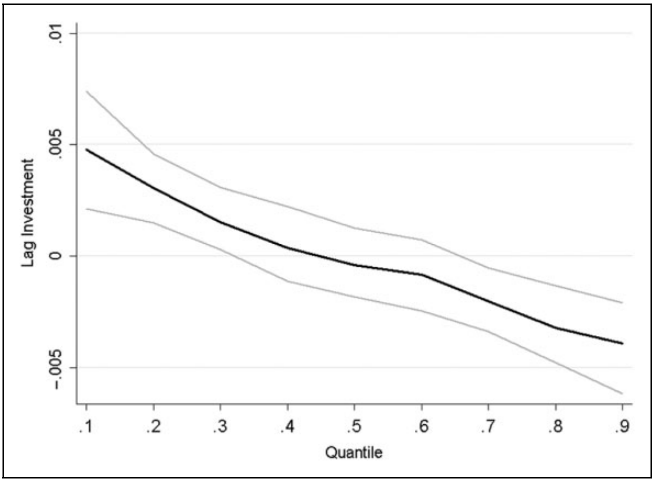

Figure 4. Quantile regression with fixed effects. Sample includes all mature firms. The graph shows the regression coefficients from a quantile regression with fixed effects, of dividends on investment, and other controls.

as well as a simple bins model instead of a linear investment variable, we have found no evidence that dividends react negatively to investment at low levels of investment, while we have found evidence that dividends do react negatively at high payout and high-investment firms.

Discussion and Conclusions

Understanding whether dividend payouts slow corporate investment, whether by drawing down cash on hand or otherwise, is important to understanding the ultimate "real-economy" impacts of policies that affect the way corporations compensate their investors. Recent natural experiment-based evidence from Yagan (2015) shows that the uptick in dividend payouts following the 2003 dividend tax cut did not affect corporate investment. Regression evidence over longer time horizons (rather than following a single tax policy change) like Auerbach and Hassett (2003) suggest that dividends and investment are negatively related—that higher payouts go with lower investment—for the average firm.

We reconcile these two findings by showing that the negative relationship between dividends and investment in mean analysis is entirely an artifact of cross-sectional variation. Within-firm OLS results show a precisely estimated zero. While on average firm dividend payouts have no statistically discernible relationship with investments, pooled and fixed effect quantile regression results reveal that this mean behavior masks considerable heterogeneity. Fixed effect quantile regressions show that low-payout firms (firms below the thirtieth percentile of dividend payouts) actually exhibit a statistically significant positive relationship between lagged investment and dividends, though these quantiles are censored. For these firms, higher payouts follow more investment. For firms in the middle quantiles, the estimated coefficient is not significantly different from zero. High-payout firms, on the other hand, exhibit a negative relationship between dividends and lagged investment. Higher payouts follow slack investment. Our findings strongly suggest that the focus of earlier work on mean behavior missed important nonlinearities in the relationship between investments and dividend payments. With the use of quantile regression techniques as well as a simple bins model using ten deciles of investment instead of a linear investment variable, we have shown that dividends react positively or nonnegatively to investment at modest levels of investment and negatively at high levels of investment.

If the relationship between dividends and investment differs for firms at different points in the dividend payout distribution, our consideration of policy options may need to be more nuanced as well. For high-payout firms, it appears that dividends come at the cost of investment. Policies that encourage dividend payouts may actually *reduce* corporate investment, if retained earnings are the primary source of financing for marginal projects and these firms are the source of most marginal investment. When policy makers are concerned with weak corporate investment, encouraging payouts may be a costly policy choice. If high-payout firms are choosing payouts to reduce wasteful spending by management, then they are paying for their poor corporate governance with lower investment levels. Further work that can shed light on whether poorly governed firms make bigger payouts and then invest less could help us better understand the operational consequences of poor governance-driven dividend payouts.

At the same time, it appears that low investment and moderate-payout firms boost dividends and investment in short succession; when they can afford to invest they can afford to pay dividends. If these firms are simply making payouts to satisfy investors and lower the cost of their primary source of capital—that is, equity is their marginal source of investment capital—then reducing dividend tax burdens on these firms may in fact boost investment. On the other hand, if these firms are using dividends to signal their quality any policy that encourages payouts will simply add more noise. Given the nonlinear relationship between dividend payouts and investment, we may need to give more careful thought to all measures that affect payouts and the types of firms they are likely to affect. Research that can help us better understand why start-ups and other small firms pay out dividends can inform how policy can best avoid distorting their investment choices.

Authors' Note

Nirupama S. Rao currently (August 2015 to July 2016) works as a senior economist for the Council of Economic Advisers (CEA). The CEA disclaims responsibility for any of the views expressed in this article, and these views do not necessarily represent the views of the CEA or the United States.

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Notes

1. Retained earnings may indeed play a prominent role in financing marginal projects. As stated in Bradford (1981) "most corporate equity capital is generated by internal investment rather than new share issues." Between 1980 and 1985, more than two-thirds of gross investment by US nonfinancial corporations was internally financed. While the financing of the marginal project need not match the average financing patterns, the stark pattern is suggestive.
2. Fiscal year end dates vary, but for more than half of the observations in our sample, the fiscal year ends in December.
3. In a few cases, we have multiple observations for a firm in the same fiscal year. We keep only one of these observations. This data issue is unlikely to affect our results as it results in the dropping of only nine firm–year observations.
4. More specifically, our sample consists of observations with fiscal year end dates from June 30, 1964, to May 31, 2012.
5. Fiscal years 1950 through 1963 have 100 or fewer observations per year.
6. This is standard in the literature, since these companies are not suited to study these kinds of models. For example, see Auerbach and Hassett (2003) and Chetty and Saez (2006). Also note that our industry classifications are based on North American Industrial Classification System codes, rather than Standard Industrial Classification (SIC) codes as in Auerbach and Hassett (2003). However, our results are robust to using either classification.
7. Auerbach and Hassett (2003) use different cutoffs for different variables in order to avoid problems with outliers. We use the more standard approach of winsorizing the data.
8. In making this determination, we utilize all available observations from 1964 through the current year, including those that subsequently get dropped for the other reasons described at the beginning of the section (e.g., major mergers or missing data).
9. Since Tobits cannot correctly be estimated with fixed effects, we do not attempt to do so.

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